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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/932,253	08/16/2001	Chi Wu	LIGHT1900-1 (LIGHT2260)	3916

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EXAMINER
CULBERT, ROBERTS P

ART UNIT	PAPER NUMBER
1763	12

DATE MAILED: 08/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/932,253	Applicant(s) WU ET AL.	
	Examiner Roberts Culbert	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 July 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *96-168* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *96-168* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/30/03 has been entered.

Claim Objections

Claims 122, and 124 are objected to because of the following informalities: *"fluorine-containing includes"* should be *"fluorine-containing gas includes"*. Appropriate correction is required.

Claim Rejections - 35 USC § 102

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 96, 98-109, 111-113, 116-118, 121-124, 147-156, 158, and 161-167 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,303,512 to Laermer.

Laermer teaches a method of forming vertical features (Fig.1) in silicon by applying an etching medium including a fluorine-containing gas, one or more partial passivants, and oxygen. Laermer teaches that the fluorine containing gas may be SF_6 or NF_3 optionally mixed with argon (Col. 2, Lines 37-40). Oxide formers such as oxygen and a secondary reactant such as SiF_4 are used for sidewall passivation (Col. 2, Lines 40-53). Laermer also teaches that CHF_3, C_4F_8, CF_4, C_2F_6, or C_3F_6 may be added to the gas mixture to accelerate the breakdown of Si compounds (Col. 3, Lines 52-56). Laermer teaches that the pressure for the etching composition is 15 mTorr in inductively coupled plasma in one

exemplary embodiment (Col. 5, Lines 46-51). Laermer further teaches that the ratio of partial passivant to fluorine containing gas may be 0.5 to 20 or 0.1 to 100. See (Col. 4, Lines 15-25) of Laermer for provided ranges. Laermer also teaches that the composition may be applied continuously or in an alternating fashion (Col. 1, Lines 30-57; and Col. 4, Lines 20-37).

Laermer does not teach the limitation of smoothness, however, it may be assumed that the limitation is inherent in Laermer because smoothness is a latent property and the method steps of Laermer are the same as in the claimed invention.

Laermer does not teach that the etched silicon pattern may be used as a waveguide, however, the limitation is seen only as intended use since the claimed method does not actually form a "waveguide surface". There is no cladding material applied to the core material, which as one of ordinary skill in the art knows, provides the means to direct light and therefore function as a waveguide. Therefore the Laermer reference provides a waveguide surface that is the same as the "waveguide surface" of the claimed invention. Note that Figure 1 of Laermer shows a ridge pattern as required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the

examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 96, 98-109, 111-113, 116-118, 121-125, 127-134, 136, 137, 139, 142-144, 147-156, 158, and 161-167 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S Patent 4,927,781 to Miller in view of U.S. Patent 6,303,512 to Laermer.

Referring to figure 2, Miller teaches a method for forming an optical component that includes forming an oxide mask (16) over a light-transmitting medium (14) so as to protect a region of the light-transmitting medium where a waveguide is to be formed; and applying an etching medium to the light-transmitting medium so as to form one or more waveguide surfaces using plasma etching (Col. 3, Lines 35-57). Referring to Figure 1, Miller likewise shows obtaining an optical component having a light-transmitting medium (14) positioned over a base (10) and applying an etching medium to the light-transmitting medium so as to form one or more waveguide surfaces as required by Claim 125.

Miller does not teach the etching composition for the plasma etching, however Miller does teach that it is well known in the art of forming waveguides to use silicon for the light transmitting medium (Col. 1, Lines 20-43).

Laermer teaches a method of forming vertical features (Fig.1) in silicon by applying an etching medium including a fluorine-containing gas, one or more partial passivants, and oxygen. Laermer teaches that the fluorine containing gas may be SF_6 or NF_3 optionally mixed with argon (Col. 2, Lines 37-40). Oxide formers such as oxygen and a secondary reactant such as SiF_4 are used for sidewall passivation (Col. 2, Lines 40-53). Laermer also teaches that CHF_3, C_4F_8, CF_4, C_2F_6, or C_3F_6 may be added to the gas mixture to accelerate the breakdown of Si compounds (Col. 3, Lines 52-56). Laermer teaches that the pressure for the etching composition is 15 mTorr in inductively coupled plasma in one exemplary embodiment (Col. 5, Lines 46-51). Laermer further teaches that the ratio of partial passivant to fluorine containing gas may be 0.5 to 20 or 0.1 to 100. See (Col. 4, Lines 15-25) of Laermer for provided ranges. Laermer also teaches that the composition may be applied continuously or in an alternating fashion (Col. 1, Lines 30-57; and Col. 4, Lines 20-37).

It would have been obvious to one of ordinary skill in the art at the time of invention to use the silicon etching composition of Laermer to etch the silicon light-transmitting medium of Miller. One of ordinary skill in the art would have been motivated to use the etching medium of Laermer in order to provide a reliable etching operation which is resistant to malfunction and to allow lower substrate temperatures as taught by Laermer (Col. 2, Lines 30-33).

Miller in view of Laermer does not teach the limitation of smoothness, however, it may be assumed that the limitation is inherent in Laermer because smoothness is a latent property and the method steps of Laermer are the same as in the claimed invention.

Claims 97, 110, 126, 135, 138, 157, and 168 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,927,781 to Miller in view of U.S. Patent 6,127,278 to Wang.

As applied above, Miller teaches the method of the invention substantially as claimed, but does not teach the etching composition for the plasma etching, however Miller does teach that it is well known in the art of forming waveguides to use silicon for the light transmitting medium (Col. 1, Lines 20-43).

Wang teaches a method of forming vertical features (Fig.1) in silicon by applying an etching medium including a fluorine-containing gas, one or more partial passivants, and oxygen. Wang teaches that the etching medium may consist of SF_6, HBr, and O_2 (Col. 2, Lines 9-11). Wang also teaches that the etching medium has a molar ratio of fluorine-containing gas to oxygen of 0.1 to 10. See claim 10 of Wang.

It would have been obvious to one of ordinary skill in the art at the time of invention to use the silicon etching composition of Wang to etch the silicon light-transmitting medium of Miller. One of ordinary skill in the art would have been motivated to use the etching medium of Wang in order to provide a composition that will etch the silicon light-transmitting medium of Miller at high etch rates as taught by Wang.

Claims 114-115, 119, 120, 140, 141, 145, 146, and 158-160 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller in view of Laermer as applied above, and further in view of U.S. Patent 6,127,277 to DeOrnellas.

As applied above, Miller in view of Laermer disclose the method of the invention substantially as claimed, but do not show the etching medium being applied to wafers having at least one dimension with a length 6-8 inches.

Referring to Figure 6, DeOrnellas shows a continuous etching chamber (38) configured to etch silicon wafers having at least one dimension with a length from 6-8 inches (Column 6, Lines 2-7). DeOrnellas teaches that the chamber is a suitable apparatus for the purpose of etching vertical sidewalls in a silicon semiconductor wafer (Column 2, Lines 33-40).

It would have been obvious to one of ordinary skill in the art to use the chamber of DeOrnellas because it was known in the art at the time of invention to be a suitable apparatus for etching vertical features in a silicon wafer.

Regarding the limitation of etchant uniformity, the limitation is not given any patentable weight because uniformity is a latent property that arises from the etching composition, etching apparatus, and process conditions. Since the process materials (silicon and etching medium) and method steps (pressure, molar ratio) and apparatus (inductively coupled plasma) are the same in both the cited references and the claimed invention, it may be assumed that the limitation is inherent in the method of Laermer.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982);

In re Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 96-168 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-34 of copending Application No. 09/845,093 in view of U.S. Patent 6,127,277 to DeOrnellas. Although the conflicting claims are not identical, they are not patentably distinct from each other because the examined claims would have been obvious over the reference claims in view of the prior art as applied above.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (703) 305-7965. The examiner can normally be reached on Monday-Friday (7:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

R. Culbert

August 8, 2003

GREGORY MILLS
SUPERVISORY PATENT EXAMINER
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